Leading-Edge Green ICT Research and Development

We are concerned with reducing environmental burdens from the initial policy formulation stages in our leading-edge research and development, and are continuously creating technologies that contribute to saving energy and the use of next-generation sources of energy.

Basic Approach

Promote the Development of Products and Services that Contribute to Lower Environmental Burdens

To achieve the goal of reducing CO2 emissions by about 30 million tons a year in Japan by 2020, as proposed in our medium-term environmental vision Green Policy 2020, we need to develop revolutionary leading-edge technologies that are even more effective at reducing environmental impact.

Fujitsu Laboratories Ltd., which handles the Fujitsu Group's leading-edge green ICT R&D, has introduced the slogan "Further strengthen leading-edge green ICT R&D and contribute even more to Fujitsu Group business," and is pushing forward with R&D on technologies that can help lower environmental burdens. Based on the concept of Green R&D, we are establishing and implementing policies from an environmental standpoint in all development work, from materials and devices through to facilities, systems and solutions.

Initiatives in FY 2011

Quantitatively Evaluating CO2 Emissions Reduction Benefits from the R&D Stage

To accelerate our environmentally oriented R&D, for all of our leading-edge technologies being developed, starting from the initial R&D phases, Fujitsu Laboratories promotes initiatives to quantitatively evaluate the benefits in reduced CO2 emissions (i.e., the environmental contribution) to be expected from the use of its products and services. These efforts are implemented across all units in our laboratories, and since researchers can evaluate the technologies they are responsible for, we can clarify the main advantages of the technologies from an environmental standpoint. Furthermore, by adding "the environment" to the axes of "performance/functionality/quality" and "cost," R&D of leading-edge technologies that is balanced across all three of these axes becomes possible.

Basic Approach to Research and Development

Promoting the development of revolutionary leading-edge technologies with green ICT as a priority area

- Rendering visible the low-carbon benefits across the entire value chain
- Low-carbon technologies for ubiquitous equipment
- Energy-saving technologies for datacenters and networks
- Environmental solution technologies

Exhibiting synergies between total technology development and open innovation

- Consolidation of elemental technologies from materials and devices to solutions
- Global technology coordination

The Fujitsu Group Environmental Protection Program (Stage VI) sets up "Strengthening leading-edge green ICT R&D" as a priority and divides this into two areas with specific targets: the area of next-generation datacenters and networks, and the area of solutions.

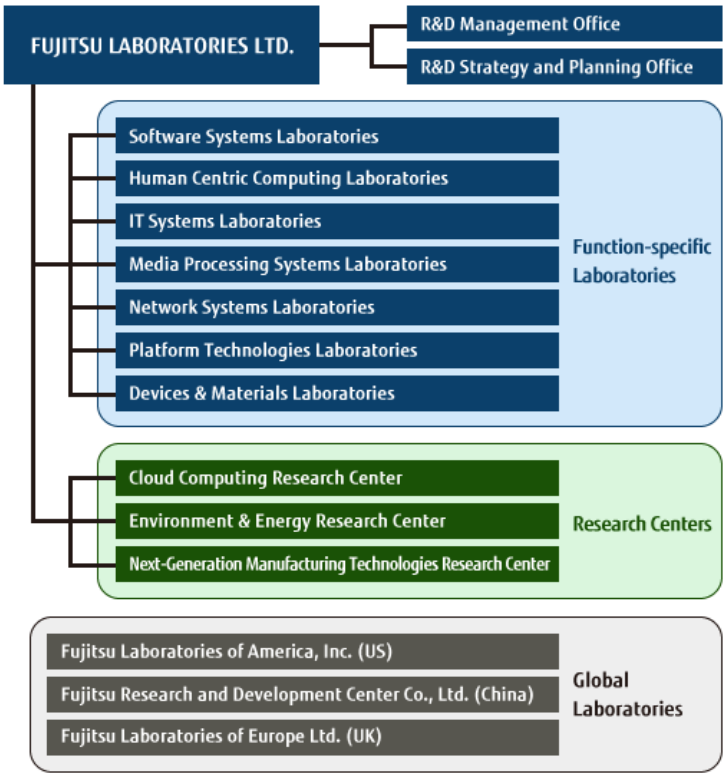
The target for the next-generation datacenter and network area is developing technologies that can double the overall efficiency of ICT equipment by the end of FY 2012 (April 2012 - March 2013). The target for the solutions area, also by the end of FY 2012, is to increase by at least 70% the development ratio for technologies that improve the effective reduction of environmental burdens.

In FY 2011 (April 2011 - March 2012), we cleared the target of developing technologies that can increase ICT equipment efficiency by 1.5 times. In the solutions area, meanwhile, we were able to achieve a development ratio of 61% for technologies that improve the effective reduction of environmental burdens, and thus met our target of 60% for the fiscal year.

While further increasing the environmental contribution of our leading-edge technologies, Fujitsu Laboratories will aim to expand the

application areas to areas such as complete systems, including those in which the individual technologies, operations and management work together.

Organization of Fujitsu Laboratories Ltd. (As of March 2012)



Case Study

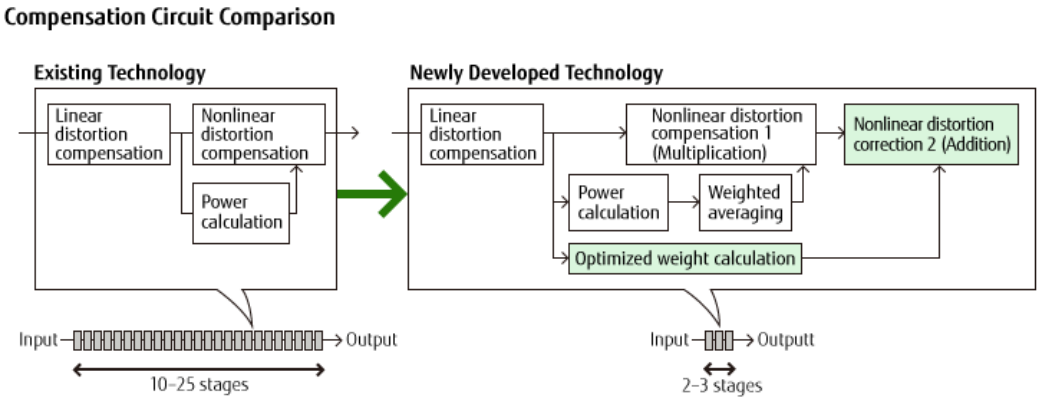
High-Performance Distortion-Compensation Circuit, Enabling Compact and Energy-Efficient Ultra-High-Capacity Fiber-Optic Transmission Systems

In September 2011, Fujitsu developed a digital signal processing algorithm to compensate for waveform distortions in signals transmitted by fiber-optic cables in long-haul transmission systems of 100 km or more.

When transferred over long distances of hundreds of kilometers by fiber-optic lines, ultrafast signals carrying data at speeds of 100 Gbps or more suffer from waveform distortion caused by nonlinear optical effects, making it difficult for the signal to be correctly received. This has prompted research into nonlinear compensation technology, which can restore the signal received with distortion to a clean waveform. Using conventional methods, however, the implementation of nonlinear compensation technology would require massive circuits, and reducing the scale required of such circuits, therefore, has been a pressing issue. In September 2010, Fujitsu developed a proprietary technology that would dramatically simplify these circuits. However, ongoing improvements in terms of circuits that are more compact and consume less electricity are still needed.

This latest Fujitsu technology will make it possible to deliver circuits that are more compact and have lower power consumption than ever before. Networks using this technology would enable the utilization of massive data volumes at ultra-high speeds, resulting in networks capable of supporting the next generations of smartphones and cloud services.

Striving toward commercialization of this technology around 2015, Fujitsu is studying a wide range of potential applications, among them the technology's use in high-capacity short-range transmissions, such as those used in datacenters and access networks.



- Fujitsu Develops High-Performance Distortion-Compensation Circuit, Enabling Compact and Energy-Efficient Ultra-High-Capacity Fiber-Optic Transmission Systems [Press Release]

Case Study

Cooling Technology That Utilizes a CPU's Waste Heat

In November 2011, Fujitsu developed cooling technology that employs waste heat generated by CPUs to produce chilled water that can be used to cool server rooms.

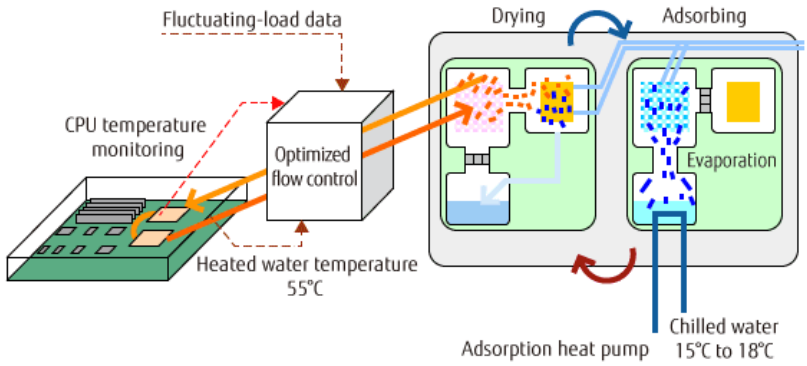
Most factories currently produce chilled water using electricity as a way to cool equipment. However, efforts are also being undertaken to produce chilled water from high-temperature waste heat.

Effectively utilizing heat from CPUs to continuously chill water as a coolant requires hot water that is consistently at 65°C or above. Accordingly, the cooler (below 65°C) waste heat from CPUs was long thought to be unsuitable for the production of chilled water. The variable loads on CPUs also result in inconsistent temperatures, another factor that has made exploiting waste heat from ICT equipment difficult. Consequently, this waste heat has typically been vented outside by air conditioning, without being used productively for cooling.

Against this backdrop, Fujitsu's new cooling technology has made it possible to continuously produce chilled water using the relatively cool 55°C waste heat that CPUs emit. Using water chilled by the waste heat from CPUs in air-conditioning systems can reduce total air-conditioning power requirements for a datacenter by roughly 20%. This means that power consumption by a single server rack can be cut by as much as 12,000 kWh per year, or a volume of CO2 equivalent to that absorbed by 360 cedar trees.

Going forward, we are working to increase the reliability of these technologies, and expanding their scale and space efficiency, with the goal of deploying them in datacenters around 2014. Moreover, Fujitsu aims to utilize low-temperature waste heat in areas beyond datacenters, like factories, office buildings, and solar power generators.

Overview of Cooling Technology Using CPU Waste Heat



- Fujitsu Develops Cooling Technology That Utilizes a CPU's Waste Heat [Press Release]

Case Study

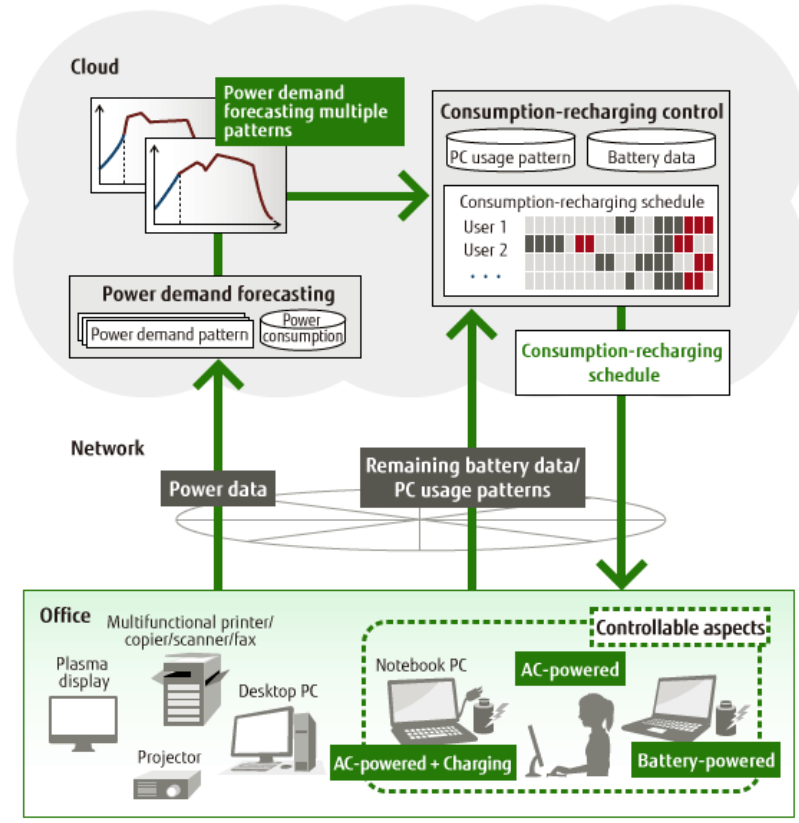
Industry's First Peak Power Demand Reduction Technology for Deployment in Smart Cities

In December 2011, Fujitsu developed the industry's first peak power demand reduction technology intended for deployment in smart cities.

There is growing expectation in Japan that new power sources will be utilized to address power supply shortages resulting from the impact of the Great East Japan Earthquake. This is likely to lead to the installation of multiple storage batteries in a variety of locations. It is anticipated that there will be greater need for a mechanism to enable peak power demand reduction and demand balancing. When the technology is actually deployed in smart cities, the ability to control the charge and consumption of electricity from multiple storage batteries across the community, as well as to cut peak power demand in stages across the entire smart city, will be essential. However, for small communities, power consumption will vary significantly depending on the number of users and electrical devices utilized, making it difficult to accurately forecast such fluctuations. Electricity consumption-recharging schedules, therefore, will need to take into consideration increases in peak power demand and the lifespan of storage batteries.

With Fujitsu's new technology, a wide range of data-including the power consumed by each office and residence, as well as other usage patterns and the charge levels of storage batteries-is collected in the cloud. By enabling cloud-based integrated control of storage batteries, peak power demand can be effectively reduced. Going forward, Fujitsu aims to deploy this technology in smart cities to help realize societies that are better able to supply their own energy needs and ensure energy supply stability.

Peak Power Reduction Technology Applied to an Office Setting



- Fujitsu Develops Industry's First Peak Power Demand Reduction Technology for Deployment in Smart Cities [Press Release]

Case Study

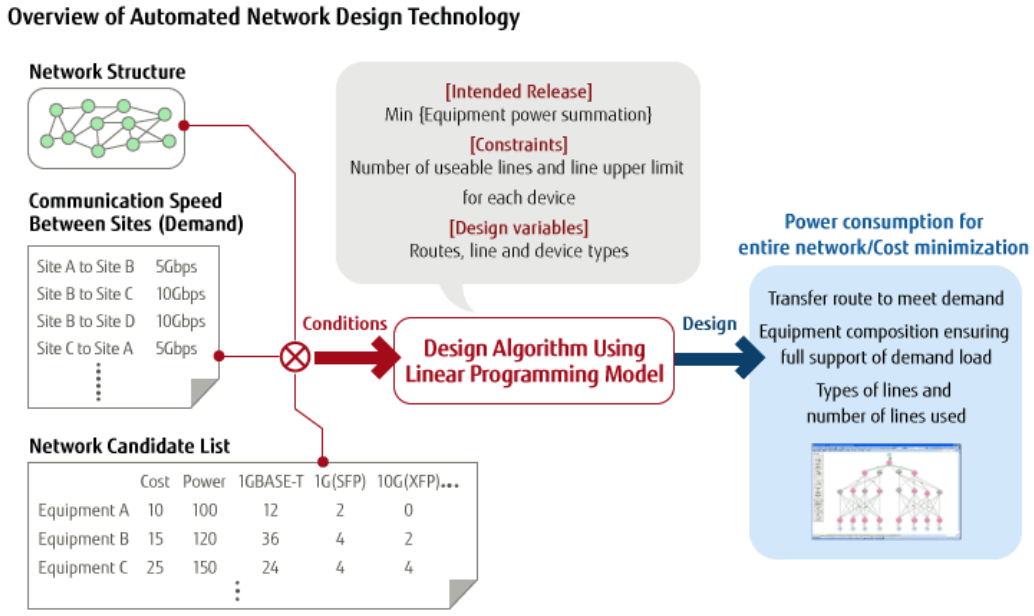
Automated Network Design Technology for Power Reductions of 20%

In August 2011, Fujitsu successfully developed an automated design technology that fulfills requirements for communication speed and network architecture required for Ethernet networks, while enabling overall network power consumption to be reduced by roughly 20% compared to previous levels.

Conventionally, network design has involved putting top priority on accommodating data traffic at peak times; thus system engineers would augment high-speed lines and design the layout of high-performance network devices to accomplish this. Depending on the network devices and line connections, engineers faced the problem of limiting power consumption when it was high, and had to consider a multitude of design conditions, such as communication speeds between sites. As a consequence, the overall picture was often difficult to grasp and excess power consumption tended to occur.

This new automated design technology not only makes it possible to reduce network power consumption but also to design low-cost networks with the customer's preferred network architecture, communication speeds and devices.

Looking ahead, we intend to further develop this technology so it can be applied to non-Ethernet networks, and conduct further research with a view to its commercial viability.



- Automated Network Design Technology for Power Reductions of 20% [Press Release (in Japanese)]

Eco-Friendly Products

We are accelerating the development of Green Products and Super Green Products, and are working to reduce environmental burdens throughout the product life cycle as highlighted below.

Eco-Friendly Product Development

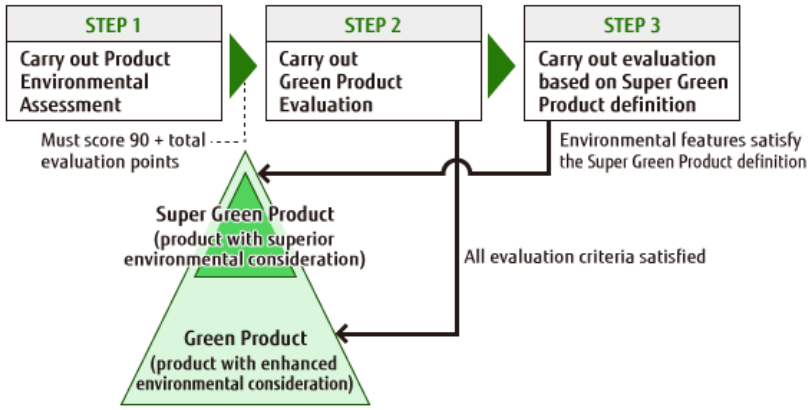
The Fujitsu Group has adopted a unified Group-wide approach to eco-design for newly designed products and works to improve environmental performance throughout the product life cycle. We have been implementing our own environmental assessments for products since 1993, and strive to develop eco-friendly products that reflect environmental considerations in such areas as energy saving, 3R design*1, non-use of hazardous chemical substances, packaging materials, and information disclosure.

Moreover, in 1998, to further strengthen development of eco-friendly products, we established Green Product Evaluation Standards and positioned the products that satisfy them as Green Products. Then, in FY 2004, we combined what had previously been two separate sets of regulations - for product environmental assessment and for Green Product evaluation - into a single set of standards with even higher levels of consideration for the environment. We called these Product Environmental Green Assessment Regulations, and they have helped to both strengthen our Green Product development efforts and make them more efficient.

Furthermore, since FY 2004, we have been working on what we call "Super Green Product" development for newly developed products. Super Green Products are those that meet the required conditions for Green Products and are also top class in terms of low energy consumption and/or 3R design technology, non-use of hazardous substances, packaging materials and use of ecofriendly materials and technologies. Super Green Products are products or systems recognized as having superior environmental characteristics to others we supply or are available on the market. Starting in FY 2010, the definition of Super Green Product has been revised to be the more strict "being in the top level in both energy saving and some other parameter (such as resource saving)."

To promote Green Product development across Fujitsu globally, we established an internal standard, the Eco Design Standard*2, that conforms to the IEC 62075*3 international standard and strives to meet the environmental requirements of the market. Fujitsu PCs and servers are designed in both Japan and Europe and are provided globally. In FY 2011, another 22 products were recognized as being Super Green Products.

Mechanism for Green and Super Green Product Evaluation



*1 3R design:
Design based on the principles of reduce, reuse and recycle

*2 Eco Design Standard:
Covered equipment is PCs, servers, and storage systems.

*3 IEC 62075:
Audio/video, information and communication technology equipment-Environmentally conscious design. This standard was published in 2008 and established as JIS C 9914 in 2010 in Japan.

Case Study

PRIMERGY RX300 S7, the PC server that improves energy consumption efficiency by as much as 73%

Companies doing business globally need to ensure the datacenters they operate in each country are environmentally friendly. Improving energy efficiency not only enables operators to process a greater volume of data within their existing power capacity without placing a burden on their cooling systems, but also leads to reduced environmental impact. Given these needs, Fujitsu's PRIMERGY RX300 S7 is the world's first single-node server to exceed 5,000 overall ssj_ops per Watt under the SPECpower ssj®2008*4 benchmark for server energy efficiency.

PRIMERGY RX300 S7

ServerView Suite is a server management solution that supports simplified and automated PRIMERGY energy management, and enables PCIe ports to be automatically turned off when not in use. Coupled with state-of-the-art technology, like power supply units boasting a 94% conversion efficiency rate, we improve energy efficiency by up to 73% over our previous products, helping Fujitsu to set a new record under SPECpower_ssj ®2008. Readily recyclable materials were also employed, and make up more than 99% of the total material utilized for the server itself.

*4 SPECpower_ssj ®2008:
A benchmark developed and sold by Standard Performance Evaluation Corporation (SPECR) for measuring the energy efficiency of mass-market computers.

VOICE

Senior Vice President, Fujitsu Technology Solutions Product Development Group
Jens-Peter Seick

For datacenters, making the most efficient use of available resources is a challenge that requires substantial investment and time. The Fujitsu Group offers a multitude of innovations that are up to the task. We will provide products tailored to our customers' efficiency and performance needs, regardless of datacenter scale.

Case Study

The ESPRIMO Q910, Reducing Carbon Footprint Across the Lifecycle

By employing a high-efficiency power unit, the ESPRIMO Q910 delivers reduced heat output and power consumption in response to customer needs for greater energy conservation. The compact design takes up less desktop space, and the eye-catching design was named a winner of the "red dot design award" in 2012.

ESPRIMO Q910

Because most compact PCs use an external AC adapter, the typical AC adapter has a standard conversion efficiency of 87%. The ESPRIMO Q910, on the other hand, offers a power supply unit that achieves 90% conversion efficiency installed on a chassis just 1.9 liters in volume, while still enabling HDD and memory expansion.

In addition, many of the models in the ESPRIMO series use halogen-free printed circuit boards, in a further effort to reduce environmental impact. The elimination of halogen and PVC*5 from chassis parts has already been adopted by the various eco-labels, but with the ESPRIMO line, Fujitsu has succeeded in removing PVC from cable insulation and the plastic parts used in fans, and also offers customers PVC-free power cords.

*5 PVC:
Polyvinyl chloride

VOICE

Fujitsu Technology Solutions Work Place Systems, Research & Development, Hardware
Peter Kastl

While it was a challenge for us to meet all of the needs involving safety, production, and serviceability, we were faced with particular difficulties in ensuring scalability.

Case Study

New ATM FACT-V X200's Default Eco Mode Cuts Power Use by About 40%

FACT-V X200 uses about 40% less power than our earlier models*6 when running in its default eco mode. When not in use for a specified time, FACT-V X200 shifts into super eco mode, automatically shutting down the unit to reduce standby power consumption by around 75%*6.

This Super Green Product was designed with the environment in mind, using recycled plastic and plant-based resin for some of its parts and aiming for a higher product recycling rate. It also offers much better operability, with a next-generation bill recycling unit offering top-class domestic currency storage capacity, compatibility with diverse operation procedures, and highly reliable design.

*6:
Compared with Fujitsu's earlier models FACT-V and FACT-V model10

FACT-V X200

VOICE

**Project Manager, Technology Department I, Financial Systems Business Group, Fujitsu Frontech Limited
Satoshi Mukaikawa**

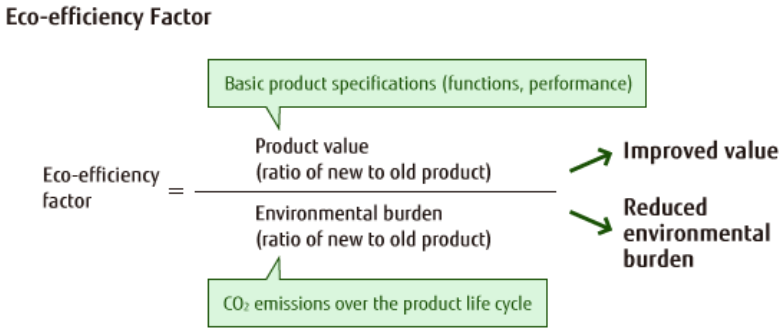
ATM components cover very extensive ground, from control units to mechanical units, firmware, middleware, and applications. We succeeded in drastically reducing power consumption by clarifying numerical targets right from the start of development, putting the engineers charged with various aspects of development on the same page, and taking committed steps to reduce power consumption at the component level.

- Eco-Friendly Products : Case Study Archives

Using the Eco-Efficiency Factor to Reduce Product Environmental Burden

We introduced the eco-efficiency factor*7, which simultaneously evaluates both environmental burden reductions and product value increases for newly developed Green Products, in the Fujitsu Group Environmental Protection Program (Stage V) in FY 2007. In the Fujitsu Group Environmental Protection Program (Stage VI), we changed the base fiscal year for products from FY 2005 to FY 2008 and are continuing these activities. In FY 2011, we also revised our targets upwards based on actual results as of the end of FY 2010. In FY 2011, we exceeded our newly established target of 3.5, with an actual result of 4.1. Product lines primarily responsible for contributing to these results included our photonics solutions, mission critical IA servers, and our base stations. These improvements were achieved in part through improvements in transmission speeds and data processing capabilities, and through reductions in product weight and energy consumption.

*7 Eco-efficiency factor:
A method for comparing old and new products that quantitatively grasps improvements in both product environmental burden and value (functionality and performance). This is an environmental index that promotes the creation of products that can provide even higher values with even lower environmental burden.

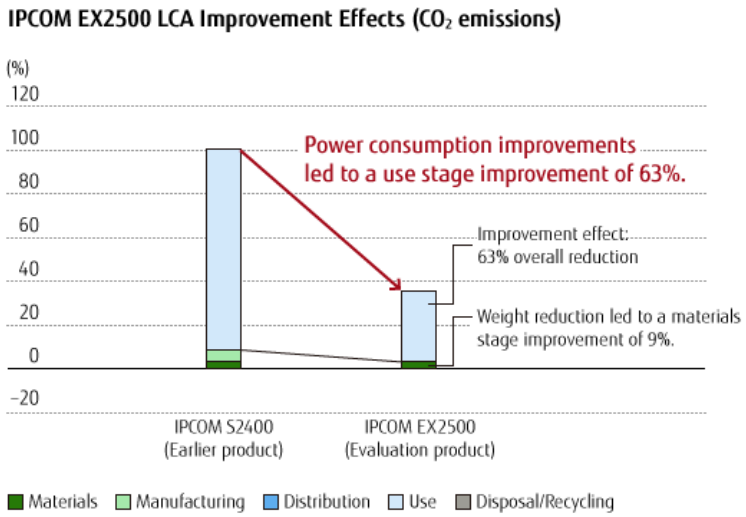


Carrying Out Life Cycle Assessment (LCA)

The Fujitsu Group has made it obligatory to perform LCAs for all its Green Products. Calculation standards have been formulated for each product family, and the Group efficiently evaluates the environmental burdens of its products using its own database*8.

Performing LCAs makes it possible to determine which parts of a product's life cycle account for the greatest proportion of the environmental burden, so that environmentally friendly products can be designed effectively. We also apply the expertise developed through our LCA activities to calculate the eco-efficiency factor, and are actively using this as a tool for communicating with our customers.

*8 Own database:
Our own unique database of unit values, created by Fujitsu Laboratories based on input-output tables.



Promoting 3R Design

Through its proprietary product environmental assessments and Green Product evaluations, the Fujitsu Group is working to apply a wide variety of 3R-friendly technologies that conserve resources and improve recyclability. Technologies being incorporated into our products that are effective in conserving resources include ways to reduce the number of parts and cables, to save space through improved performance and more tightly integrated design, and digitization of manuals and other documentation.

We are also working to improve recycling rates by utilizing readily reusable parts from the product design stage; and by putting a recycling structure in place, we promote the recovery and recycling of used ICT equipment. For example, usable parts are separated and extracted from products returned from leasing, and after checks to verify they are of the same quality as new parts, are either reused as parts in new products or as spare parts for maintenance.

Eco-Friendly Packaging

Fujitsu is working on a variety of methods for reducing use of packaging and cushioning materials. Traditionally, notebook computers were shipped packaged in individual cardboard boxes, but by placing multiple units in a single returnable container, we have reduced shipping space and succeeded in eliminating cardboard waste. For larger products, we have replaced existing foam cushioning materials with returnable air packs, significantly reducing CO2 emissions. We also use soy-based inks, which are lower in volatile organic compounds (VOCs), a known atmospheric pollutant, to print the boxes used in packaging PCs and other equipment.

Reducing Specific Chemical Substances in Products

We cooperate with our business partners in striving for strict management of chemical substances whose use is restricted by laws and regulations in Japan and overseas, as well as of other potentially harmful substances.

Management of Chemical Substances in Products

The Fujitsu Group designates substances that are harmful to people and the environment and whose use is either prohibited or regulated by law as "Fujitsu Group Specified Banned Substances." We provide products that do not contain such substances by strictly prohibiting their use in our products and by working to eliminate them through our green procurement programs.

We also recognize that minimizing the risks posed by certain chemicals is of the highest priority in ensuring our customers' safety. For this purpose, we designate substances suspected of being harmful (Substances of Concern) as "Fujitsu Group Specified Controlled Substances," or "Fujitsu Group Specified Reportable Substances," and, based on principle of prevention, we manage the amounts included so that we can transition to forbidding their use in stages as the danger of these specified substances becomes clear.

This effort is not limited to regulations in Japan but also applies to global regulations on chemical substances included in products.

- **Fujitsu Group Specified Banned Substances [145KB]**
- **Fujitsu Group Specified Reportable Substances [150KB]**
- **Fujitsu Group Specified Controlled Substances [65KB]**

Management of Chemical Substances Restricted or Banned by Law

"Fujitsu Group Specified Banned Substances" comprise two separate categories: universally banned substances and substances that are banned at the national and/or regional level.

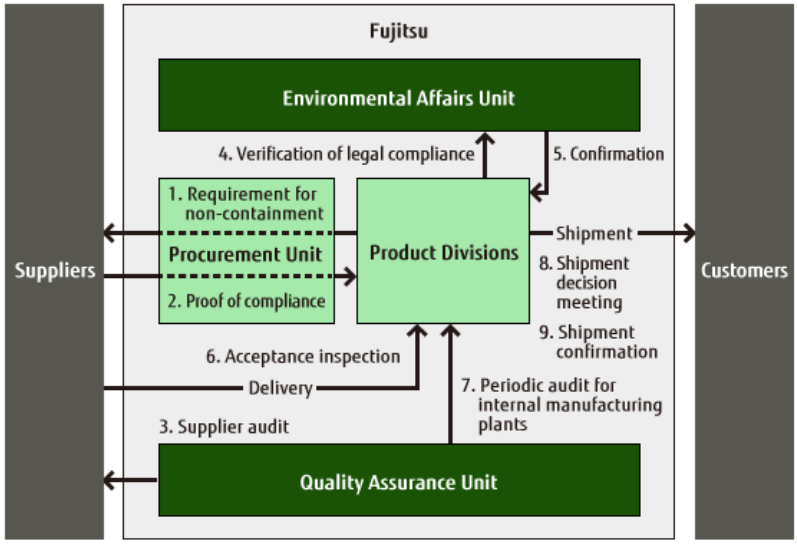
We have also established a Fujitsu Group Green Procurement Direction and strengthen control of the chemicals in our products by taking the initiative in directing our suppliers to construct chemical management systems (CMSs).

- Green Procurement

In response to regulations such as the RoHS Directive*1, we have taken systematic action covering the entire supply chain by constructing a system headed by our product business division and including our quality assurance, purchasing, and environmental divisions, to manage chemical substances from design through to delivery.

*1 RoHS Directive:
Restriction of the use of certain hazardous substances in electrical and electric equipment

Framework for RoHS Directive Compliance



* Fujitsu Group companies are also constructing own frameworks based on the above figure.

Controlling Substances of Concern

The Fujitsu Group Specified Reportable Substances list includes substances that are REACH regulation*2 candidate substances*3, and we collect information on substance amounts from suppliers and then manage these quantities on a per-product basis. Moreover, the Specified Controlled Substances list also includes data from suppliers on amounts for substances that may not be restricted by every country's regulations, but which we consider to be of concern.

As far as PVC is concerned, we not only control the amounts included in our products but also require in our Green Procurement Direction that it be used as little as possible, and restrict its use in everything except sheathing for cables and insulating materials for electronic components. For example, the Fujitsu ESPRIMO Q910 desktop PC, which made its market debut in June, 2012 mainly in Europe, adopted halogen-free printed circuit boards (PCBs) and a (partially) PVC-free approach.

*2 REACH regulation:
Regulation concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals

*3 REACH candidate substances:
Selected chemical substances with properties (carcinogenicity, mutagenicity, reproductive toxicity, etc.) regulated by REACH. If these substances are present in products, data on the amounts must be displayed.

Contributing to Creating Mechanisms for Chemical Substance Management

In the Fujitsu Group, we see efforts towards chemical substance management as an issue for the whole supply chain and so participate in activities such as the Joint Article Management Promotion consortium (JAMP) to contribute to the design, construction and widespread adoption of mechanisms that can transmit information effectively.

Among these industry groups, we were involved from the planning stages with the input format and entry support tools for the AIS (article information sheet), which is an included chemical substance information transmission sheet, and also participated in creating guidelines for appropriate management of included chemical substances and in practical education for business partners to promote the use of AIS throughout the industry. Furthermore, we are in charge of activities promoting the use of the JAMP information distribution infrastructure (JAMP-IT), which supports information exchange requests from multiple companies to create an environment for the smooth transmission of information.

The Fujitsu Group is not only actively monitoring substances specified under REACH regulations; since June 2011 we have also been introducing AIS across the Group in order to better understand and manage the presence and utilization of substances suspected to contain hazardous elements. Moving forward, we hope to effectively utilize the data we have collected to make significant contributions toward minimizing the impact of chemical substances on people and the environment.

Using ICT to Control the Chemicals in Our Products

From requesting surveys by outside organizations through to gathering information by our own efforts, the Fujitsu Group maintains an integrated system for managing the information on the chemicals contained in the components and materials it purchases from its suppliers throughout its supply chain. Further, we use the large volumes of chemical-related data we collect to calculate amounts on a per-product basis, pinpointing the amounts of restricted chemicals at the product level and managing them accordingly.

The Group also offers an environmental business solution called PLEMIA/ECODUCE, a software package that utilizes this in-house expertise.

- The PLEMIA/ECODUCE website (in Japanese)

Product Recycling

We are advancing collection and recycling of end-of-life ICT products from a global perspective to help create a recycling-minded society.

Recycling Activities that Conform to the Concept of Producer Responsibility

In accordance with the concept of Extended Producer Responsibility (EPR*1), under which the producer's responsibility for its products is not limited to the product design and manufacturing stages but extends to the disposal and recycling stages as well, the Fujitsu Group carries out recycling programs that comply with the waste disposal and recycling laws and regulations of the various countries in which it operates. We also try to do as much collection, reuse and recycling as we can even in countries where recycling is not obligatory, in line with the concept of Individual Producer Responsibility (IPR), which sees each producer as responsible for its own products.
IPR is a major challenge for the Fujitsu Group in expanding its business globally, but we believe that responding to this challenge and that of EPR in collaboration with industry associations and governments will enable us to help create a recycling-minded society in which the requirements and demands of all stakeholders are met.

*1 EPR :
Extended Producer Responsibility. The view that the manufacturer's responsibility lies not only in product design and manufacture but also extends to the disposal and recycling phases. This concept was made explicit in Japan's Fundamental Law for Establishing a Sound Material-Cycle Society enacted in June 2000.

Targets and Achievements in Stage VI of the Environmental Protection Program

Targeting a sustained 90% resource reuse rate*2 of business ICT equipment globally at Fujitsu recycling centers, in FY 2011 we achieved a rate of 94.1% (90.9% within Japan and 98.5% overseas).

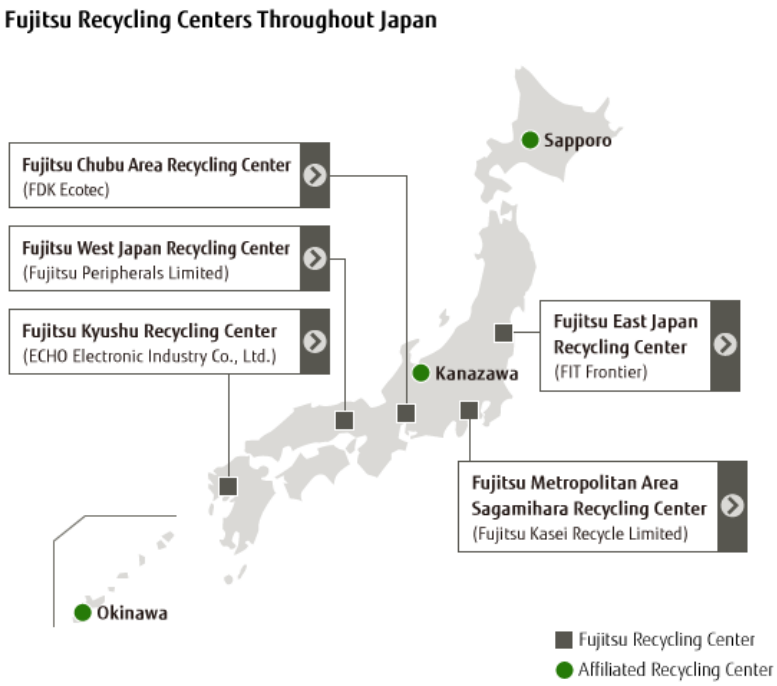
*2 Resource reuse rate:
The ratio of the amount (by weight) of recycled parts and resources to the amount of end-of-life business ICT products processed.

Promoting product recycling efforts in Japan

As an enterprise with official designation for wide-area industrial waste disposal in Japan, Fujitsu engages in various kinds of contracts for accepting industrial waste for appropriate processing.

We have established Fujitsu recycling centers throughout Japan to create a nationwide recycling system. This system provides for rigorous traceability and security, and achieves a high resource reuse rate. By providing this safe and secure service, we are fully discharging our Extended Producer Responsibility (EPR).

Wide Area Industrial Waste Disposal Certificate



Achievements in Collecting and Recycling End-of-Life ICT Products

Although the volume of materials collected is declining due to progress in miniaturization and reduced product weights, we processed 5,487 tons of recycled ICT products from corporate customers (used ICT products for business applications) in FY 2011, and achieved a resource reuse rate of 90.9%. Also, we have now collected a total of 83,358 end-of-life PCs from individual customers.

Trends in Resource Reuse Rate of End-of-Life Business ICT Products

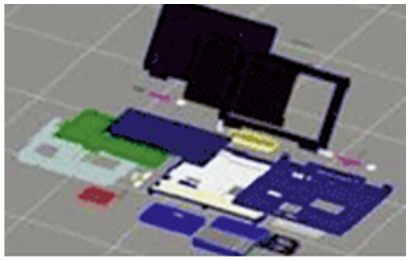
FY	2008	2009	2010	2011
Resource reuse rate	91.5%	90.8%	90.6%	90.9%

Providing Product Recycling Information

In order to properly dispose of end-of-life ICT products, since FY 2004 Fujitsu has been operating a digital management system for its product disassembly manual.

Through this system, Fujitsu recycling centers can download from our in-Group website as animated disassembly manuals all the information they need to recycle products. In addition to providing a downloadable products disassembly manual, the system provides instructions on how to deal with items containing restricted chemical substances and plastic materials, and with products that contain customer data.

Electronic Disassembly Manual Management System



Animated disassembly manuals

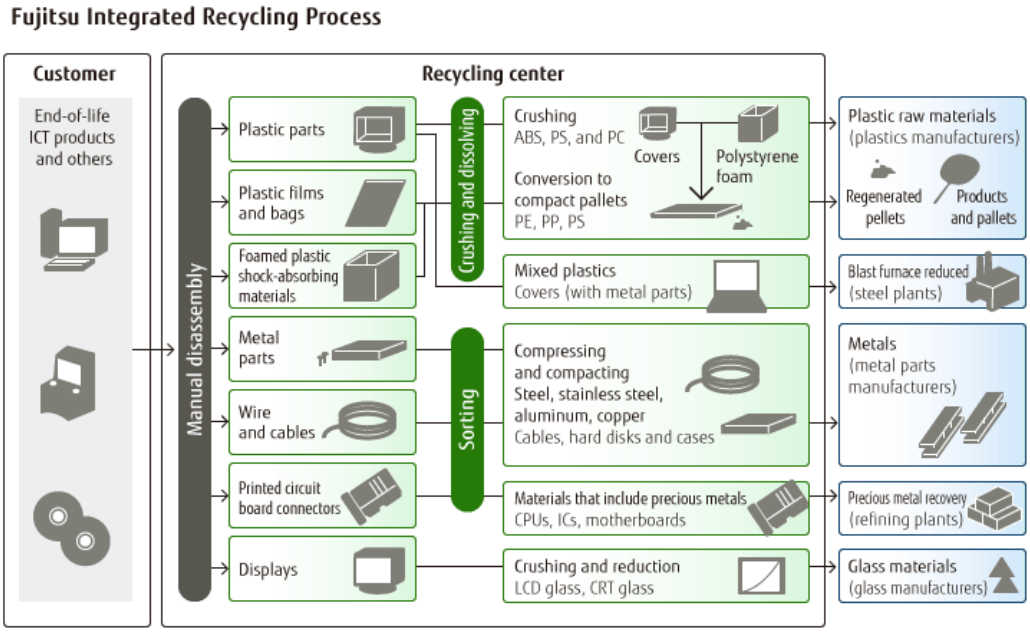
Promoting Recycling

Experienced workers carefully disassemble collected products by hand and separate the materials into categories such as steel, copper, aluminum, precious metals, glass and 20 different types of plastic. They also strive to raise their manual disassembly standards through the use of animated disassembly manuals. Materials recognition equipment has been introduced for plastics that are difficult to discriminate, so as to allow the complete segregation of different types of plastic. In addition to minimizing the quantity of waste materials in this way, we are continually trying to turn them back into resources that can be reused to make products.

Plastic material identification equipment

Ballpoint pens and folders made from recycled plastic

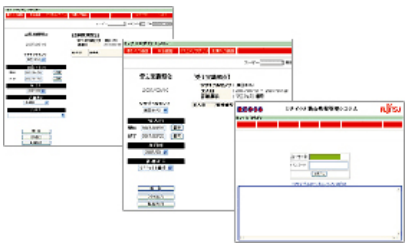
Also, to keep our customers informed of these initiatives, we distribute ballpoint pens and folders made from recycled plastic at exhibitions and other events, as well as demonstrating PCs being manually disassembled.



Developing a Traceability System

We developed an integrated recycling information management system and since FY 2007 have adopted it at the Fujitsu recycling centers.

This system prevents theft and illegal dumping by attaching barcodes to customers' ICT products and managing data on the history of the recycling process from acceptance at the recycling center through disassembly and destruction of the hard disks on a per-customer basis.



Integrated Recycling Information Management System

Operation of Security Systems

A high level of security is maintained at Fujitsu Recycling Centers by using infrared cameras to monitor automatically for intruders and check the storage status of the accepted products.

Security system

Security camera monitoring system

Providing services to customers

We provide recycling services for our customers.

- ICT product disposal and recycling(in Japanese)

Promoting Product Recycling Overseas

The Fujitsu Group recycles products in EMEA and the Americas (the United States, Canada, and Brazil) and Asia (Singapore, the Philippines, Australia, Hong Kong, Taiwan, and South Korea).

Visitor experiencing PC disassembly in the FTS environmental booth.

Through its partner companies, Fujitsu Technology Solutions (Holding) B.V. (FTS) recycles waste ICT products for corporate and individual customers in 27 countries in the EU, as well as in Norway and Switzerland. In addition, since 1988 at Paderborn, the Group's own recycling center in Germany, we have been contributing to the reuse of waste resources by disassembling products by hand so we can precisely classify and then appropriately recycle the materials. In 2011we processed 3,468 tons of waste ICT products and achieved a resource reuse rate of 98.5%.

To disseminate these activities widely, at CeBIT 2010, the world's largest ICT related trade show held in Germany in FY 2010, we both presented our recycling efforts and demonstrated PC disassembling at our booth and were honored by a visit from Germany's environment minister.

Also at other overseas sites we have linked up with local recycling partner companies and promoted the recycling of ICT products.

- **Singapore: Fujitsu PC Asia Pacific Pte. Ltd. (FPCA)**(Starting in 2007)
- **Brazil: Fujitsu do Brazil Ltda. (FBR)**(Starting in 2010)
- **Australia: Fujitsu Australia Ltd. (FAL)**(Starting in 2006)
- **South Korea: Fujitsu Korea Ltd. (FKL)**(Starting in 2003)

Environmental Labeling and Information Disclosure

We will actively disclose environmental information about our products to customers.

Disclosure of Environmental Information on Products

We actively disclose environmental information on our products, both via the Internet and in the form of environmental labels.

Since the end of FY 2006, we have registered notebook PCs under the EPEAT system, which encourages the purchase of green PCs and is used chiefly by US government bodies. In Japan, product environmental information for computers, magnetic disk devices, displays, printers, scanners, and mobile phones covered by national green purchasing laws is published on the Ministry of the Environment's website, while the equivalent information for computers, displays, printers and scanners conforming to the ENERGY STAR Program in Japan is published on the website of the Energy Conservation Center, Japan.

- EPEAT website: Information from the electronic products environmental assessment tool by the US Institute of Electrical and Electronics Engineers (IEEE)
- Ministry of the Environment's website: Information on products covered by Japan's green purchasing laws
- Energy Conservation Center, Japan website: Information on products conforming with the international ENERGY STAR Program
- List of PC Green Label System-compliant products: Information about Fujitsu Products in compliance with the PC Green Label System formulated by Japan's PC3R Promotion Association
- List of registered EcoLeaf label products: A list of Fujitsu products that have obtained the "EcoLeaf" label developed by the Japan Environmental Management Association for Industry The EcoLeaf environmental label is granted to products that quantitatively demonstrate outstanding environmental performance in carbon emissions and throughout the entire product lifecycle, from resource extraction, manufacture, distribution and usage, to disposal and recycling.
- List of products with Eco Mark certification: A list of Fujitsu products that are certified with the Eco Mark distinction developed by the Japan Environment Association

Environmental Labeling

The Fujitsu Group displays environmental labels in accordance with the ISO 14020 series of international standards governing environmental labeling. The three types of environmental labels are highlighted below.

Type I : Label usage is approved following independent certification of the environmental qualities of a product submitted for review by a company or group.

Eco Mark (Certified by the Japan Environment Association) In January 2001, Fujitsu desktop PCs became the first in Japan to receive certification. Certification has been obtained for printers. • Japan Environment Association Eco Mark	

Type II : A company or organization independently publicizes the environmental qualities of its products.

Green Policy Innovation Logo This environmental label is unique to the Fujitsu Group, and is displayed on Green and Super Green products, where special consideration has been given to environmental performance. • Green Policy Innovation Logo	
Energy Efficiency Labeling System This label is displayed on products meeting standards prescribed by Japan's Act on the Rational Use of Energy. • Energy Efficiency Labeling System	

PC Green Label System For PCs, Fujitsu displays this mark on products meeting standards stipulated by the PC3R Promotion Association. • PC3R Promotion Association	
Energy Star program The international Energy Star Program label is displayed on computers (PCs, workstations), displays, printers, and scanners registered with the program. • International Energy Star Program	

Type III : Products that quantitatively demonstrate the environmental burden posed over the entire lifecycle.

EcoLeaf Environmental Label (Japan Environmental Management Association for Industry) In May 2003, Fujitsu notebook PCs were the first in Japan to be certified under this label. • Japan Environmental Management Association EcoLeaf Environmental Label	